

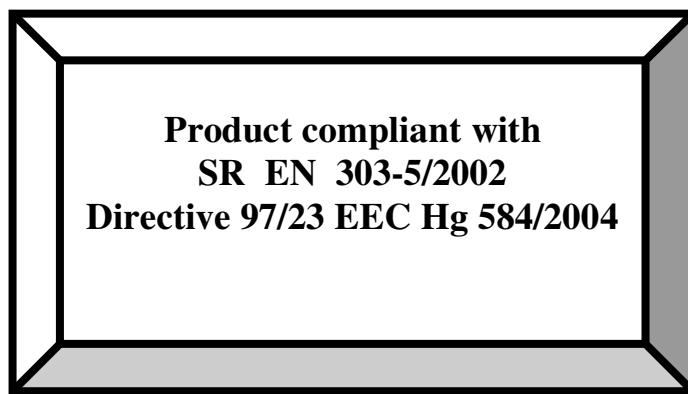


PELLET HEATING UNITS

20 kW	150 kW
40 kW	175 kW
60 kW	200 kW
80 kW	250 kW
100 kW	300 kW
125 kW	350 kW

USER'S MANUAL

Version 2012



www.ecohornet.ro

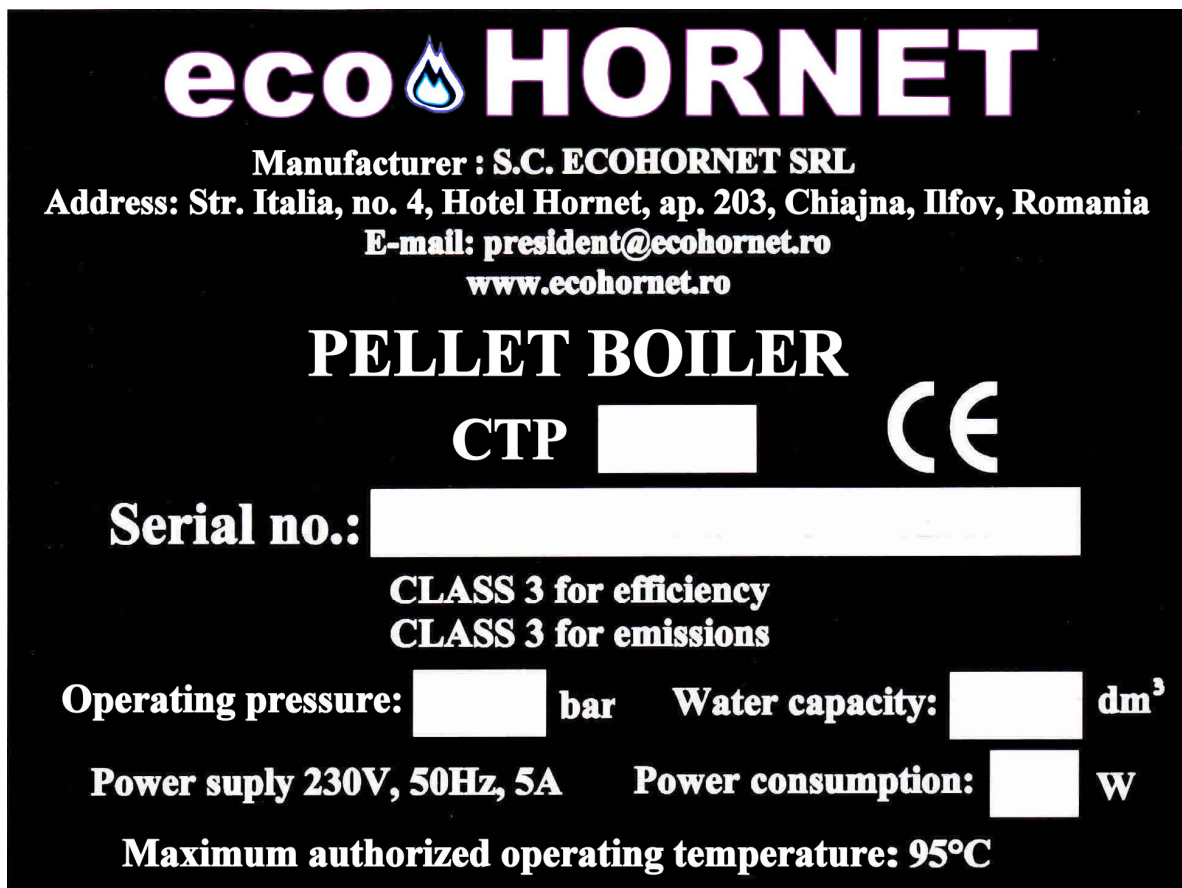
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1 General description

The **ecoHORNET** heating unit uses a burning system that is completely different from any other current heating unit. This is a Romanian invention with Patent No. A2008/00996. It is a Class 3 heating unit, certified in accordance with the European standard SR EN 303-5.

1.1 Identification



1.2 Components

The hopper for standard pellets (1) is made of reinforced fiber glass, OSB, wood, etc. and has a capacity of 0.5 m³.

The screw (2) is composed of a steel pipe and a spiral driven by a DC engine supplied by a 24 V or 220 V power source. The engine is protected by an overload fuse (15).

The pellets driven by the screw are pushed through the feeding neck (3) into the burner chamber (5) and the filling level is set through the level sensor (11), which controls the operation of the screw. The pellets that reach the burner grid are lit by an

electric lighter (4). The grid located below the feeding chamber is made of refractory stainless steel and its dimensions and air supply parameters assure optimal burning conditions. Operation is smoke-free (excepting the moment of ignition), with no creosote deposits on the boiler wall, and generate minimum amounts of ash.

The ash removal door (8) sealed with packing (7) is located under the burner.

The heat exchanger is made of steel protected against oxidation by a primer coating able to withstand temperatures up to 500°C. It has 2 separate parts – a horizontal one, which absorbs the flame radiation, and a vertical one, where heat is exchanged by convection. The heat exchanging surfaces are designed in such a way as to maintain the temperature of exhaust gases below 170 °C. To improve convection, metal spirals (16) have been inserted into the vertical pipes to generate turbulence in the gas flow. After passing through the pipes, the gas reaches the absorption chamber (19) where, due to pressure difference, part of the carried microparticles are deposited in the spaces between the pipes, build up and, after a while, fall gravitationally into the ash bin. From this chamber, exhaust gases pass through an enclosure with microparticle baffles (17) and are evacuated by a fan (9) to the existing flue or to a chimney rising above the roof ridge.

The exhaust gases can be evacuated directly into a smoke chimney or outside the heating unit room, through the wall, by concentric pipes (10) that also allow the absorption of air from the outside. In this case, the exhaust flue will be inserted in a vertical tube (21) with the diameter as specified in Table 1, whose height must exceed the roof ridge by at least 50 cm. The heating unit operates automatically in ON-OFF mode, controlled by a room ambient thermostat (13) or by the temperature probes on the boiler and/or on the buffer. The OFF command is generated by the ambient thermostat or when the temperature set for the probe (12) measuring the heating medium temperature on the supply line of the boiler has been reached.

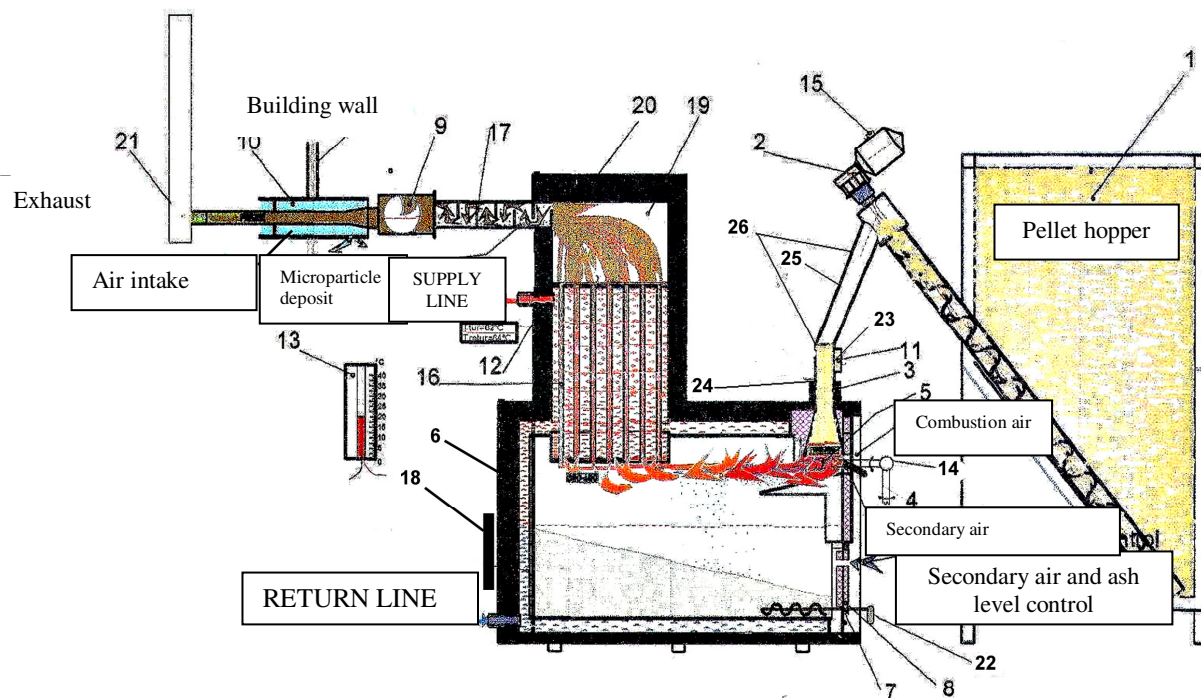
In case of accidental power failure, the heating unit is equipped with a UPS that maintains the continuous operation, for a limited period, the cleaning, fluidization and pellet discharge system (22), until the entire amount of embers and pellets is thrown from the grill into the ash bin, as well as the exhauster (9), at low rate, to evacuate the exhaust gases generated by the slow burning fuel in the ash bin.

The power supply to the heating unit must be provided with a voltage regulator of at least **1500VA** to protect the electrical components of the unit against voltage fluctuations, if the voltage of the power supply system is too low to assure the proper voltage required by the electrical equipment (e.g. voltage for exhauster at the time of ignition or if the set exhaust gas temperature is reached, the voltage required for the recirculation pump, etc.).

WARNING! ALL CONNECTIONS FROM THE GRILL TO THE SCREW (connecting flange for the feeding neck elements (25), the glass & epoxy window of the capacitive sensor (24), the intermediate hose joints (27) **MUST BE PERFECTLY TIGHT** to prevent the air from entering and the flames from rising. In this case and if the power supply is cut off completely, the fire will smolder and deposit ash on the grill until the pellets are exhausted or, if slow-feed biomass pellets are used, a carbon

crust will form at the bottom of the feeding neck and the fire will extinguish. In this latter case, in order to restart the heating unit, it is obligatory to remove the top part of the feeding neck and/or the grill in order to eliminate the crust that blocked the flow of pellets. Clean the glass and epoxy element, replace the sealing and start the unit.

WARNING! The pellet sensor is adjusted from the factory and is very sensitive. Therefore, you must contact the dealer or the manufacturer for readjustment in case of any change of position, removal, etc.



LEGEND

- | | |
|--|--|
| 1 – Pellet hopper | 15 – Motor overheating sensor |
| 2 – Pellet feeding screw system | 16 – Exhaust gas spiral |
| 3 – Burning chamber feeding neck | 17 – Microparticle baffles |
| 4 – Ignition element | 18 – Boiler access |
| 5 – Gravitational feed burner | 19 – Gas absorption chamber |
| 6 – Heat exchanger | 20 – Heat insulation |
| 7 – Seal | 21 – Exhaust piping |
| 8 – Ash bin door | 22 – Ash removal screw (optional) |
| 9 – Exhaust fan | 23 – Glass & epoxy window |
| 10 – Concentric exhaust and air intake pipe | 24 – Feeding neck elements connecting flange |
| 11 – Pellet level sensor | 25 – Pellet feeding intermediate hose |
| 12 – PT1000 thermally sensitive resistance element | 26 – Intermediate hose connections |
| 13 – Room thermostat | |
| 14 – Actuator | |

Fig. 1 Components

1.3 Technical overview of products

Heating unit type	M/U	CTP 20	CTP 40	CTP 60	CTP 80	CTP 100	CTP 125	CTP 150	CTP 175	CTP 200	CTP 250	CTP 300	CTP 350
Maximum output power	kW	20	40	60	80	100	125	150	175	200	250	300	350
Optimal heating medium temperature	°C	55-85											
Maximum operating pressure	bar	2.5		3.0	3.0					3.5	3.5	3.5	3.5
Negative pressure	mbar	0.45 – 0.65											
Weight	kg	300	370	460	540	562	584	740	768	792	886	916	948
Exhaust gas temperature	°C		120										
Depth Width Height	mm	1750	2150	2340	2450	2450	2450	2450	2450	2450	2450	2450	2450
	mm	760	760	760	990	990	990	990	990	1200	1200	1200	1200
	mm	1900	1900	1900	2150	2150	2150	2150	2150	2150	2150	2150	2150
Minimum installation space	m	3x2.5	3x2.5	3x3	3.5x3	3.5x3	3.5x3	4x3	4x3	4x3	4x3	4x3	4x3
Heating medium quantity	dm³	115	160	200	330	330	280	280	280	280	435	435	435
Standard hopper volume	m³	0.5	0.5	0.5	0.8	0.8	0.8	1.1	1.1	1.1	1.5	1.5	1.5
Boiler/buffer capacity	l	300/ 500	500/ 800	600/ 1000	700/ 1200	800/ 1500	900/ 2000	1000/ 2500	1000/ 3000	1200/ 3500	1500/ 5000	1500/ 6000	1500/ 7000
Minimum size of exhaust gas flue	mm	ø150 or □150					ø180		ø180	ø180	ø200	ø220	ø240
Pellet size	mm		diameter: 6 - 12 x length: 5 - 35										
Supply/return line connector	inch	1		1 1/2		2			2	2	2.5	2.5	3,0
Rated power	W	90			160					160	180	180	180
Power supply		220 V, 50 mA											
Efficiency	%	94-97%											

Table 1. Technical data

The **ecoHORN**ET heating units are designed for burning granular biomass in the form of pellets. The proprietary gravity feed burner and pellet burning procedure assure automatic operation at constant efficiency, with smoke-free exhaust gases and without soot or creosote (tar) deposits on the heat exchanger.

By installing two or more units in a cascade arrangement, heating systems starting from 350 kW and going up to the power desired by the user can be obtained.

The standard systems are designed to provide at least 24 hours of autonomy at maximum power and in continuous operation and ash removal every 3 days, except for the use of straw pellets, when ash must be removed every day. .

The actual ash removal frequency will be determined by the user, by measuring the amount of waste resulting from burning the pellets for 24 hours on the coldest day.

WARNING! Remove the ash before it reaches the grill. Otherwise, it will block the cooling air flow to the grill and the grill may overheat and warp.

1.4 Recommendations on selecting the fuel

The 2012 generation **ecoHORNET** heating units can use pellets made of “everything that burns”: **vegetal, farming, forestry, animal breeding waste, selected domestic waste** (as indicated by the manufacturer), **energy plants, woodchips, including with high silicon content, wood sawdust or sawdust mixtures, etc.**, of 6 mm to 12 mm in diameter and 5 mm to 35 mm in length and up to 10% humidity.

! WARNING: If improper pellets **exceeding 10%** humidity are used, the burning will be incomplete and soot deposits will form on the heat exchanger, reducing efficiency and requiring monthly cleaning.

! WARNING: If pellets containing chemical binders are used, their burning may generate deposits on the burning grill, inevitably resulting in a loss of boiler power. In such case, the burning grill must be removed and cleaned. Check the feeding chamber and use proper pellets. After cleaning, the normal boiler parameters will be restored.

1.5 Recommendations for choosing your heating unit

When choosing your type of **ecoHORNET** heating unit, you should consult with the designer of your heating system in order to appropriately estimate the necessary heat output, based on several factors. Thus, the required heat output will be calculated considering the heat insulation of the building, its cardinal point orientation, the geographical position of the building, the glazed surfaces, building volume, etc.

For advice, do not hesitate to use the information provided by our experts whose experience will help you in choosing the appropriate heating unit type. Making the right choice will result in lower costs and better comfort.

2 Installation

2.1 Installation of the heating unit and exhaust flue kit

2.1.1 Installation of the heating unit

The **ecoHORNET** heating units do not require any special installation conditions, but only a room for placing the heating unit, the standard pellet hopper, the boiler/buffer and the boiler piping. It is recommendable to use a room insulated against air humidity to prevent the pellets in the hopper from absorbing humidity.

The flue gas exhaust system (Fig. 3) also assures the intake of combustion air into the room through the wall opening. If the unit is connected to an existing smoke chimney, an alternative air intake will be provided, whose area must be at least equal to the cross-section of the exhaust flue.

The **ecoHORNET** heating units are delivered with a hydraulic safety kit, which includes a manometer, a safety relief valve and an automatic breather. The kit must be installed on the heating medium supply line, above the level of the supply pipe, in order to assure the proper venting of the boiler.

The heating unit is delivered with a flow sensor to be installed on boiler's return line (**WARNING!**: the probe of the flow sensor must be immersed in water in order to detect its movement) for protection in case of heating medium loss, blocked recirculation pump or clogged heating circuit, and a three-way anti-condensation valve to circulate the heating medium between the supply and the return lines until a temperature of 52°C is reached.

The recirculation pump and expansion tank will be sized depending on the capacity of the heating system and will be installed on the return line.

The safety kit will be installed on the supply line of the heating unit, at a +30° angle, using connecting pipes as short as possible. It is recommendable to install breathers in places where air is likely to build up in the system (at the highest points).

After installation, fill the system with heating medium (softened water) and remove the air from the system. The final bleeding is recommended to be performed with the recirculation pump supplied from a separate circuit (outlet). At the same time, you should also bleed the pump and check the system for heating medium leaks.

! WARNING: Clean the pipes thoroughly to eliminate any particles that could enter the breather and the safety release valve, affecting their proper operation.

! WARNING: The bolt of the breather in the safety kit must be open when the system is started.

After bleeding, check the pressure in the system (approx. 1.2 bar for 20-30°C water temperature).

The power supply will be from a 220 V (stabilized) source with **protective earthing**. The average power consumption with the recirculation pump off is 75-150 W.

The heating units are equipped with connectors for all the external elements of the boiler, including the recirculation pump, the anti-condensation valve, the 220-V power supply source, the flow sensor, as well as the boiler valve, the puffer probe, the bottom boiler probe and the top boiler probe, if such systems are provided. These connectors are shown in Figure 2. The necessary connection cables and probes are supplied with the heating unit.

The following systems will be connected to the heating unit (as shown in Fig. 2):

- 220 V power supply source, which must be equipped with a voltage regulator
- recirculation pump
- anti-condensation valve (normally closed)
- boiler valve (if the system includes a boiler)
- flow sensor
- puffer, boiler sensors (depending on the system)

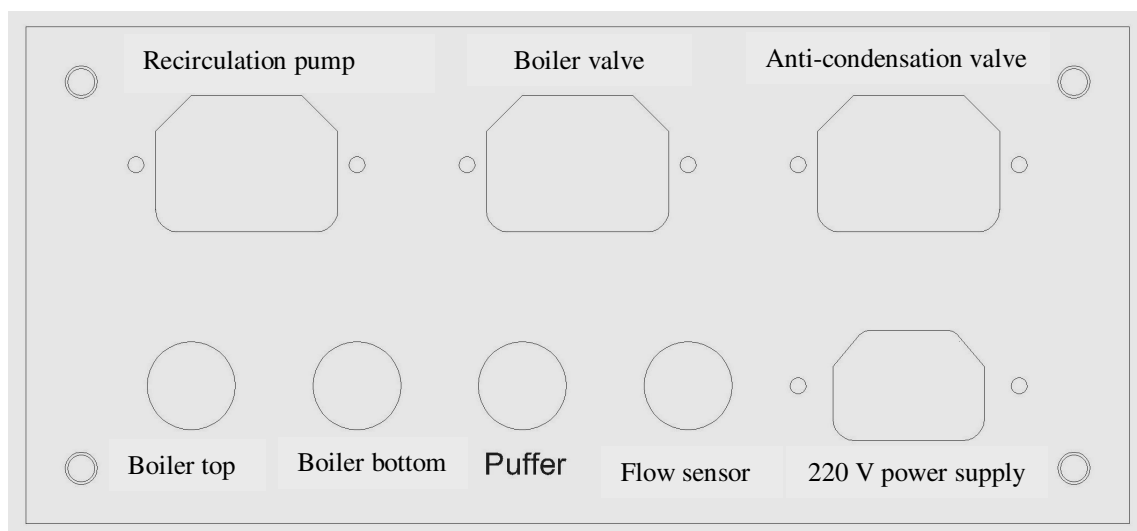


Fig. 2 – External connections

2.1.2 Instructions on flue gas evacuation

The **ecoHORNET** heating units do not require any special flue gas evacuation conditions. Each **ecoHORNET** heating unit is delivered complete with a coaxial flue kit to discharge flue gas through the wall, outside the building, while absorbing fresh air to maintain combustion, as well as the air balance in the room where the unit is installed.

The kit can be connected to an existing chimney or to a metal flue compliant with the applicable standards (i.e. exceeding in height the roof ridge) to prevent the flue gas from being pushed back into the building by air currents. If the flue gas evacuation kit is connected to an existing chimney, an independent 20x20 cm air intake must be

provided. The supplied coaxial tube must be connected to the chimney at an angle of -3° (as shown in Figure 3) to prevent the condensate from flowing down the flue into the heating unit. Before commissioning the unit, during the testing period, you must check whether sufficient natural draft is assured in any situation (with the door or windows of the heating unit room closed and/or open) to evacuate any existing gas.

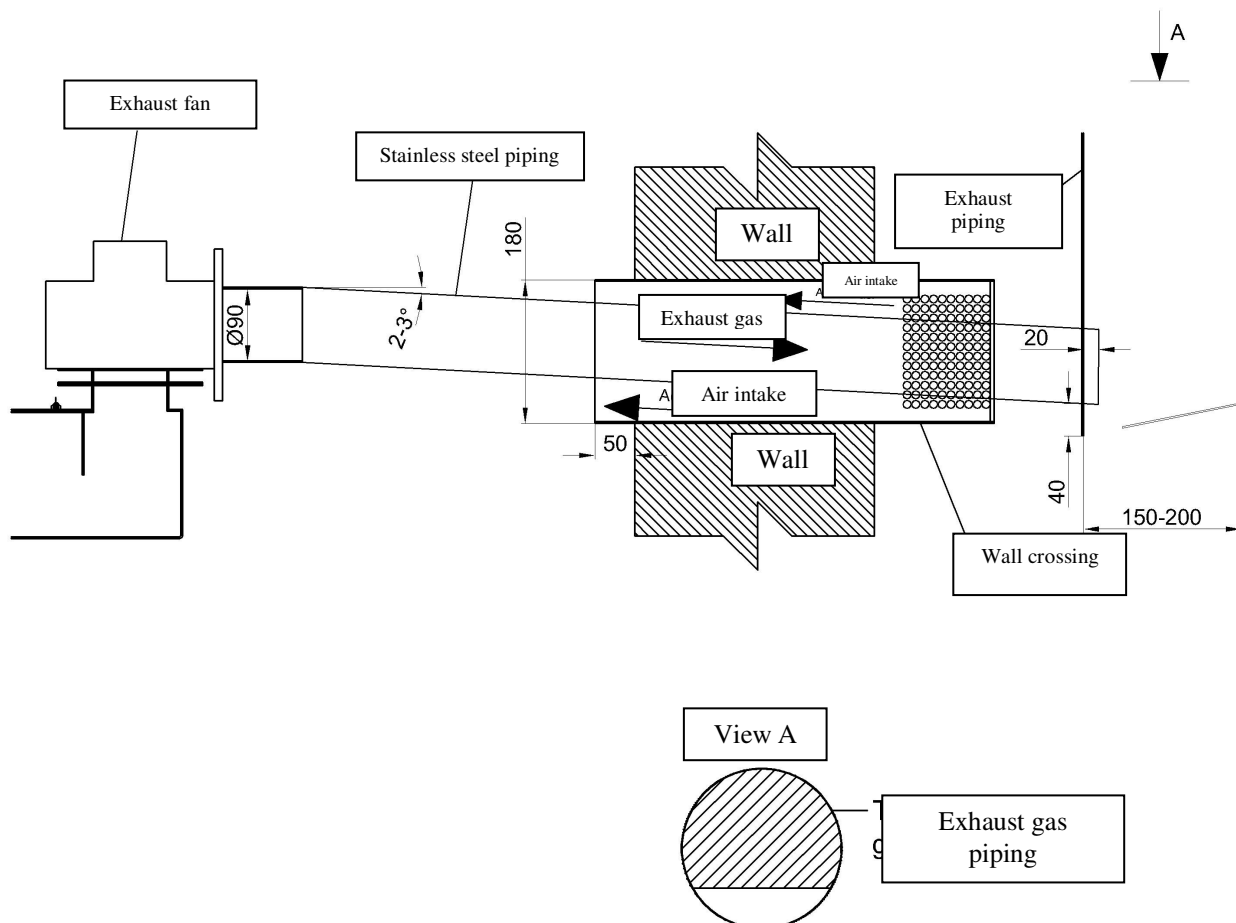
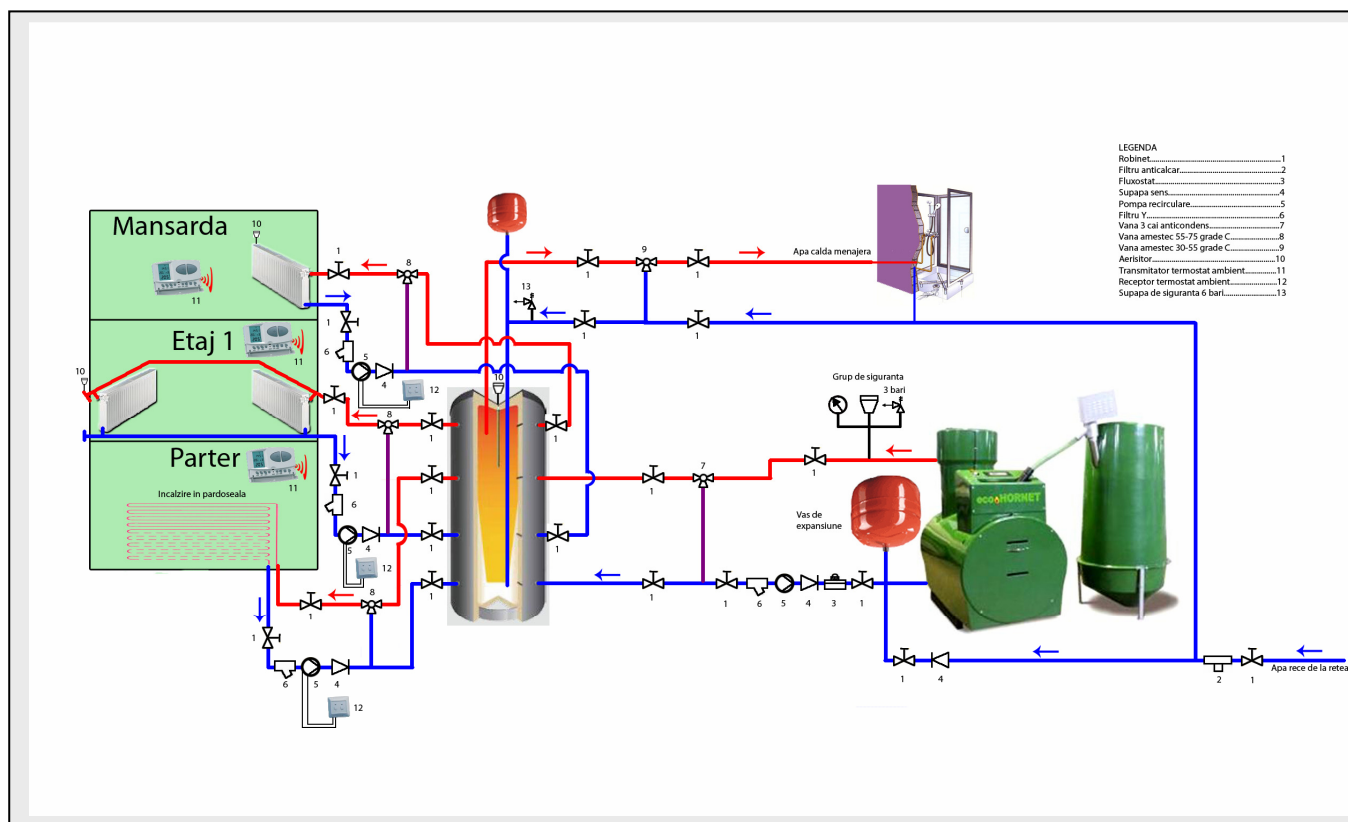


Fig. 3 Installation of flue kit

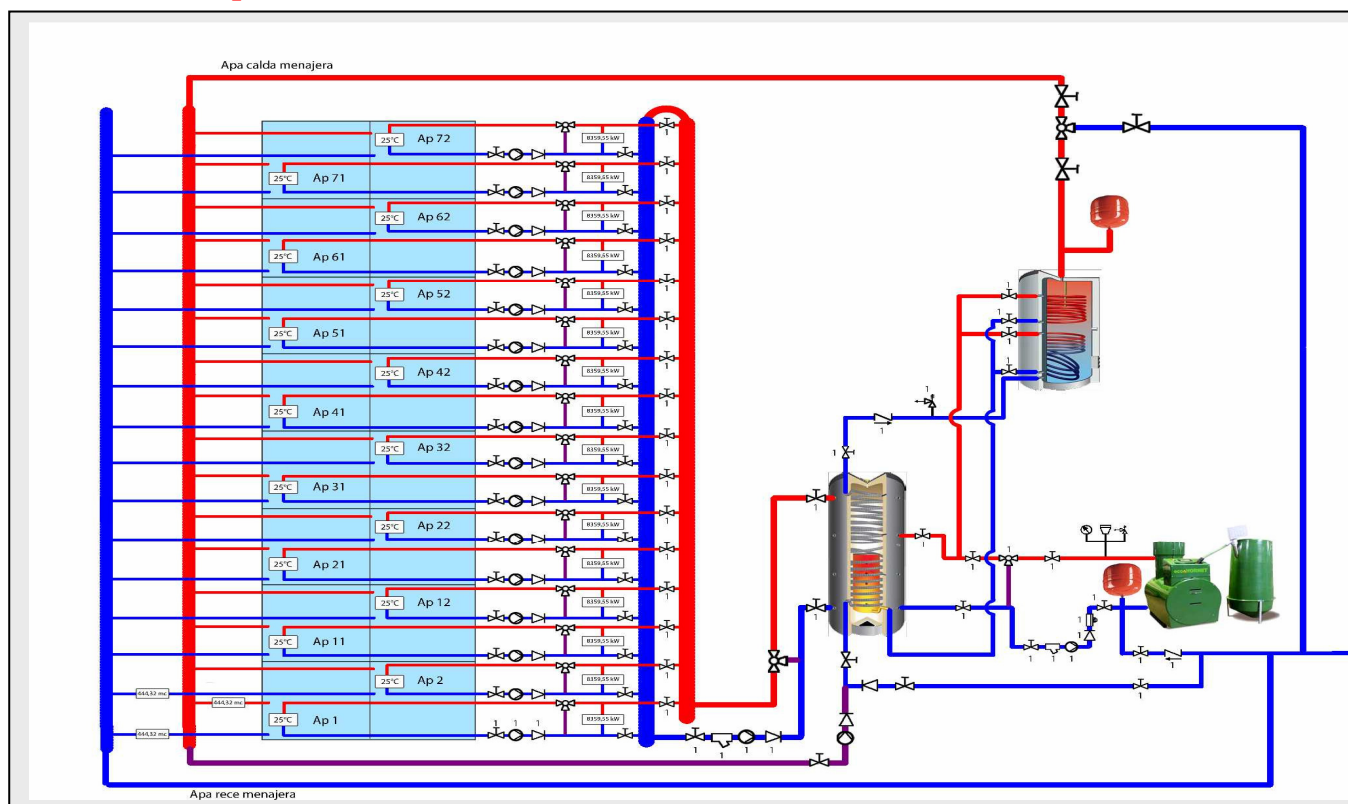
2.2 Installation versions for central heating units

2.2.1 With heat accumulator (buffer) for also producing drinking hot water

Recommended solution



Recommended solution for apartment buildings, hotels, hospitals (users with high drinking hot water consumption)



The recirculation pump between the puffer and the heating system is recommended to be connected to an ambient thermostat that will start or stop the flow of heating medium through the system depending on the needs and requirements of the user.

For larger spaces (e.g. conference rooms, cafeterias, etc.) or for multi-story buildings with large glazed areas, the heating medium is recommended to be distributed through the puffer by two or more circuits equipped with recirculation pumps connected to independent ambient thermostats. The recirculation pumps must be properly sized and started at low revolution speed to allow for the transfer of heat to the areas to be heated.

3 Commissioning instructions

3.1 Adjustments

The **ecoHORN**[®] heating units are delivered with all parameters set from the factory, but require certain adjustments before commissioning, considering the particular conditions of operation (the use of various pellet types).

The adjustments at the client's premises may be performed only by qualified personnel trained by the manufacturer or in direct consultation with one of the company's representatives.

Check the power supply source. Turn on the UPS located in the control box - the start screen (Fig. 5) will appear for a few seconds on the monitoring display.

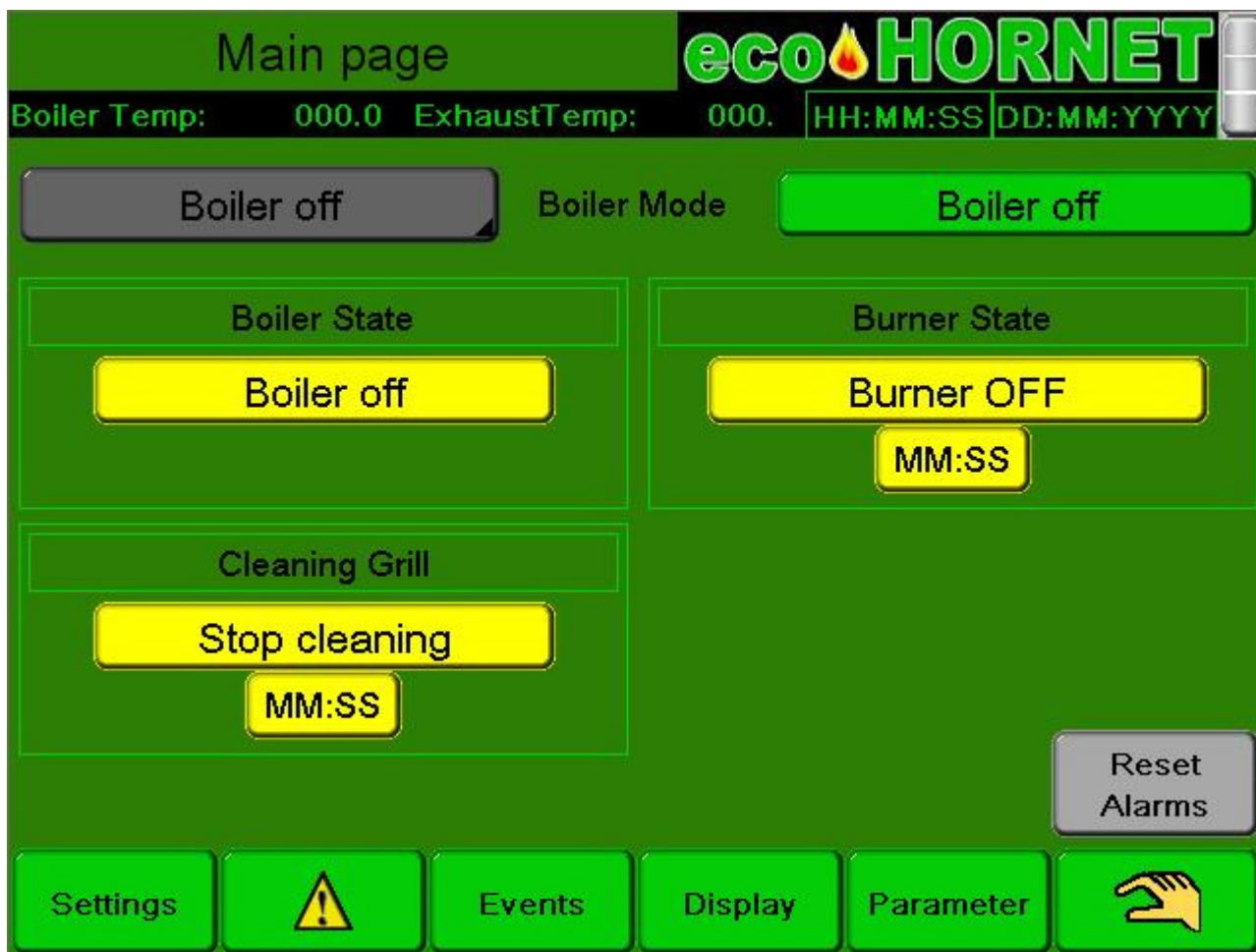


Fig. 5 The start screen

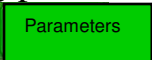
The start screen (fig. 5) shows the status of the boiler, of the burner and of the cleaning, acceleration, fluidization and pellet discharge system.

To turn the heating unit on, use the gray button in the top left corner of the screen. When the menu opens, choose one of the operating modes by touching the button twice:

- Stop - the unit will remain stopped;
- Manual - the testing mode for the unit components (pellet feeding motor, ignition elements, exhauster, anti-condensation valve, boiler valve, grill cleaning motor, recirculation pump);
- Winter - the unit will start the winter program for domestic hot water + heating;
- Puffer/Summer– the unit will start the summer program for domestic hot water.

WARNING!!! Any operation performed by unauthorized persons will void the warranty.

3.1.1 Parameter adjustment screen

The screen for adjusting the operating parameters of the **ecoHORNET** heating unit will be displayed by touching the button 

WARNING!!! The parameters are set from the factory and it is forbidden to modify them without the approval of the personnel authorized by the dealer.

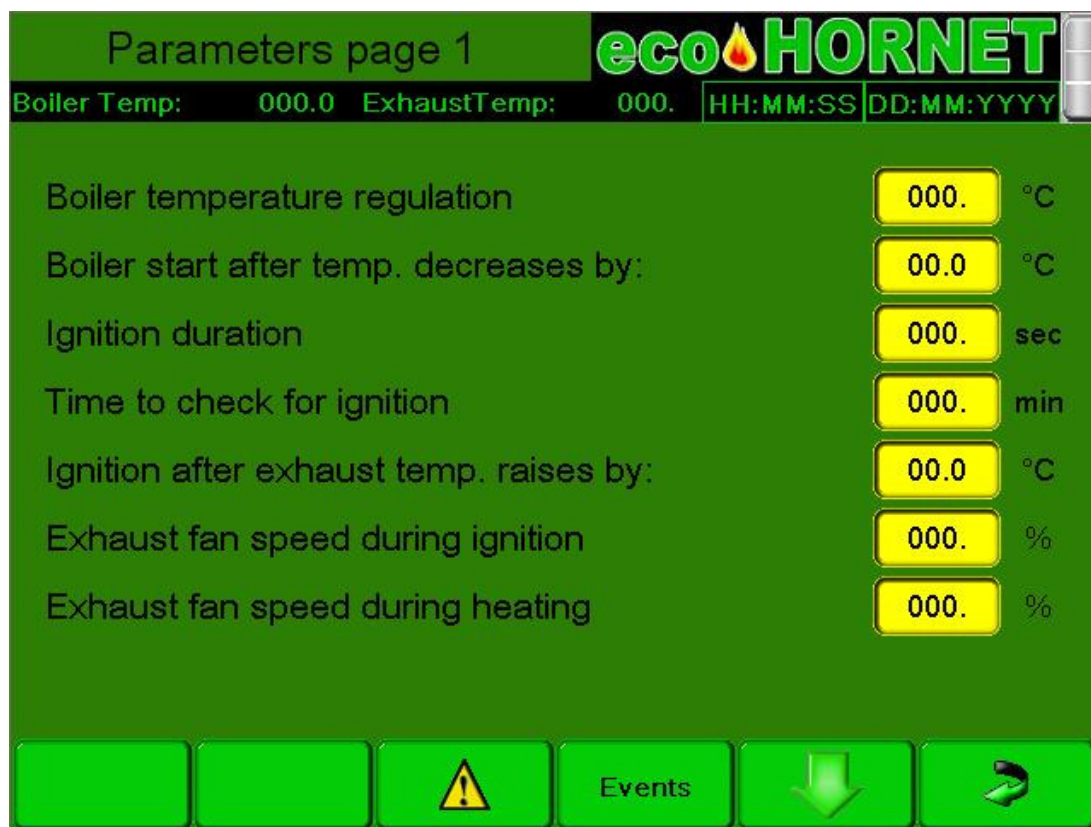



Fig. 14 Parameters page 1

The parameter adjustment screen has 4 pages and cover a wide range of situations and installation arrangements of the heating medium distribution and heating system.

Page 1 (Fig. 14) contains the following parameters:

- *Boiler temperature regulation* – this parameter adjusts the maximum temperature at which the burner enters the "Flame off" state then the water in the boiler reaches this temperature, even if an external "start" signal is present;
- *Boiler starts after water temperature decreases by* – The first condition for the unit to start. After the water temperature in the boiler decreases by the value set for this parameter under the "Boiler temperature regulation", the unit will accept the external "start" messages (ambient thermostat, start puffer, start boiler);
- *Ignition duration* – Operating time of the ignition element;
- *Time to check for ignition* – The time allocated for checking the ignition of pellets;

- *Ignition after exhaust temperature rises by* – The ignition is certain when the temperature of exhaust gas rises by the value set for this parameter over the value set for the "Time to check for ignition" parameter. If the exhaust gas temperature fails to increase by the set value, the ignition operation restarts.
- *Exhaust fan speed during ignition* – The exhaust fan speed during the pellet ignition operation;
- *Exhaust fan speed during heating (100%)*– The exhaust fan operating speed during heating;

Touching the button  the second page will be displayed (fig. 15), with the following parameters:

- *Grill cleaning starts after* – The waiting time for the first start of the cleaning, fluidization and pellet discharge system after ignition is completed;
- *Grill cleaning duration* – The time allocated for the operation of the cleaning, fluidization and pellet discharge system;
- *Duration between grill cleanings* – The time between two successive operations of the cleaning, fluidization and pellet discharge system;
- *Activation delay for cleaning sensor* – The delay from detecting the decrease of the pellet level (by the capacitive sensor) to the start of the pellet feeding motor;
- *Waiting time normal stop fire* – The time allocated for turning off the flame of the unit on manual stop, when reaching the temperature set for „Boiler temperature regulation” or when receiving a stop signal from the ambient thermostat. In this case, the feeding of pellets stops and the exhauster fan, the cleaner and the recirculation pump will operate at normal parameters.
- *Exhaust fan functioning time during quick stop* – The exhaust fan operating time (at low speed) on quick stop of the flame;
- *Grill cleaning functioning time during quick stop* – The continuous operation time of grill cleaner on quick stop of the flame;
- *Maximum pellets feeding time* – The maximum time allocated for pellet feeding on a single actuation of the screw. If the pellet feeder motor operates continuously for the time set for this parameter and the pellet feeding sensor does not detect the filling of the feeding area, it means that the quantity of pellets in the hopper is insufficient and an alarm will be displayed on the screen and the quick stop procedure will be initiated;

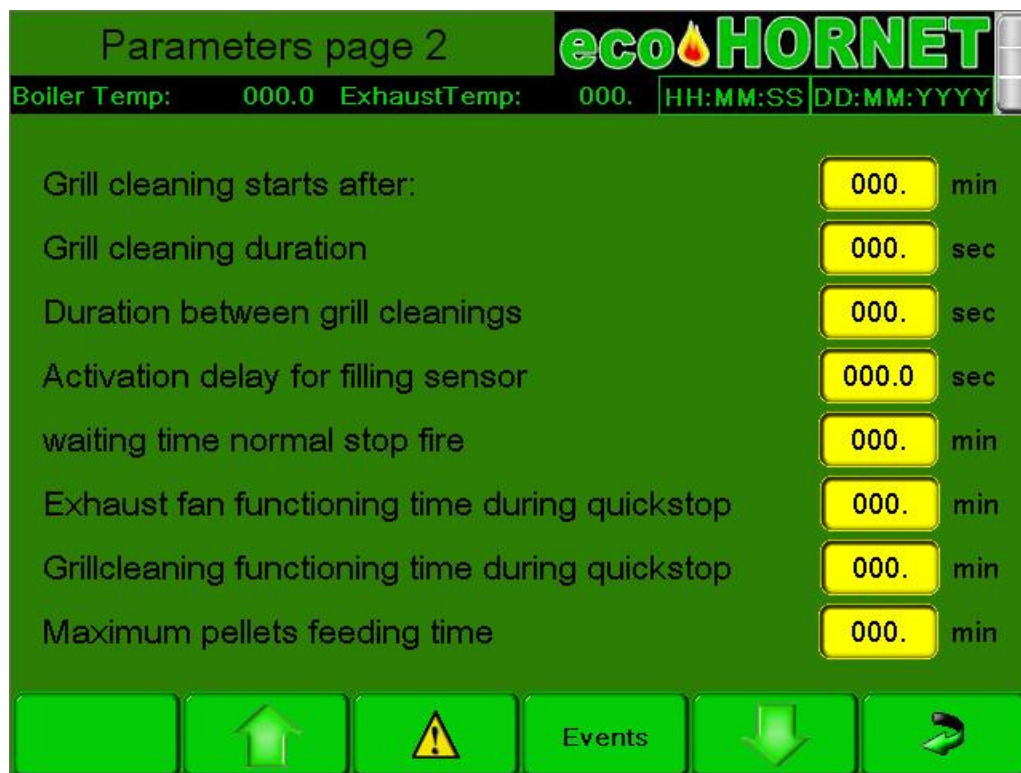



Fig. 15 Parameter page 2

Pressing the  key in the second page will display the third page (Fig. 16) containing the following parameters:

- *Safety temperature pump ON* – If the normal or quick stop procedure was initiated and the boiler temperature is higher than set for this parameter, the circulation pump will start;
- *Safety temperature pump OFF* – After temperature decreases below the level set for this parameter and the boiler is in the Stop state, the recirculation pump stops;
- *Use boiler as cascade master* – This parameter will be activated only if the unit operates in a cascade arrangement with other heating units and its boiler is used as master boiler;
- *Start second heating unit after* – If the heating unit operates in cascade with other units and is set as master boiler, this will set the time for starting the secondary boiler if the master unit fails to bring the water in the system to the set parameters;
- *Maximum exhaust temperature for ignition* – The second condition for starting the unit. If the exhaust temperature exceeds the limit set for this parameter, the exhaust fan will start and ignition will be initiated only after the exhaust temperature decreases below this limit;
- *Exhaust temperature (alarm)* – If exhaust temperature exceeds this limit, an alarm will be displayed;
- *Exhaust temperature stops boiler* – If exhaust temperature reaches this limit, the unit will stop, an alarm message will be displayed and the user must contact the

manufacturer by calling one of the telephone numbers indicated on the identification plate of the unit;

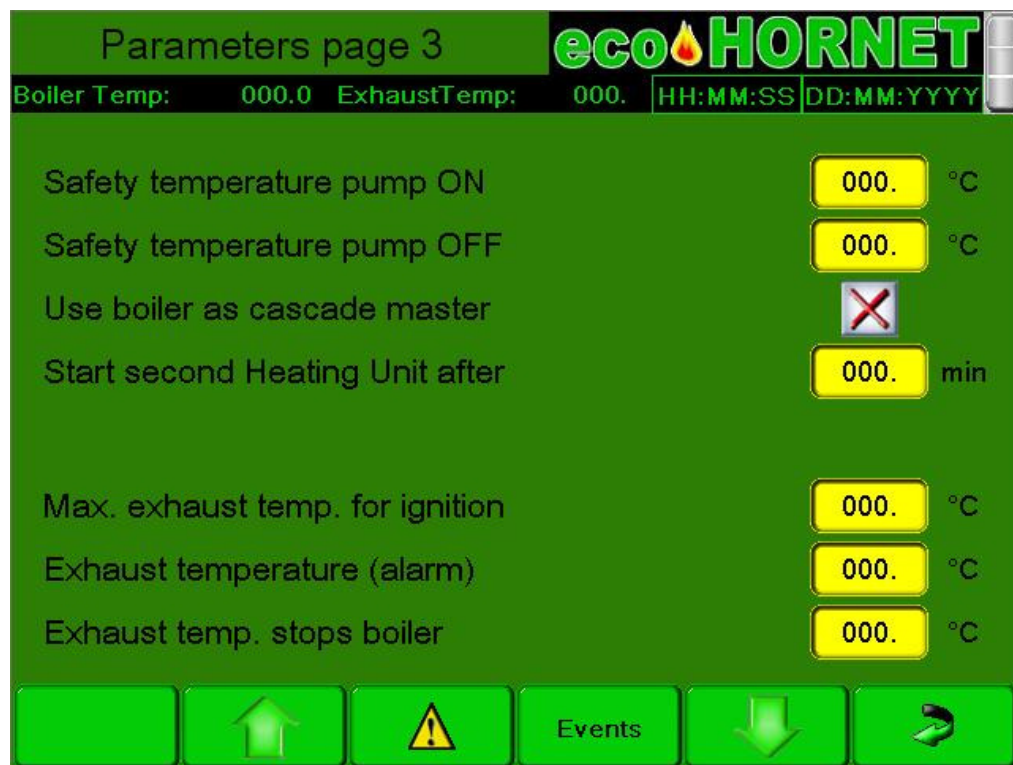



Fig. 16 Parameter page 3

Pressing the  key in the third page will display the fourth page (Fig. 17) containing the following parameters:

- *Configure system with puffer and/or boiler* – If the unit is equipped with a puffer and/or boiler, this option will be activated to obtain start signals from the probes installed on these systems, as well as to the temperature readings from these systems;
- *Hot water start temperature* – When the temperature of water inside the boiler, as read by the bottom probe, decreases below the value set for this parameter, the unit will start if the two starting conditions mentioned above are fulfilled;
- *Temperature switch to puffer* – When the temperature of water inside the boiler, as read by the top probe, reaches the limit set for this parameter, the 3-way valve will be switched to puffer/house heating;
- *Puffer start temperature* – When the temperature measured by the probe inside the puffer decreases below the value set for this parameter, the unit will receive a start signal and will turn on if the two starting conditions are met;
- *Exhaust temperature regulation* – When this exhaust temperature is reached, the draft will be automatically adjusted by gradually reducing the speed of the exhaust fan to maintain the exhaust temperature around the value set for this parameter;

- *Time between exhaust temperature checks* – The time between two exhaust temperature checks to regulate the exhaust fan speed in order to maintain the exhaust temperature around the value set for "Exhaust temperature regulation"

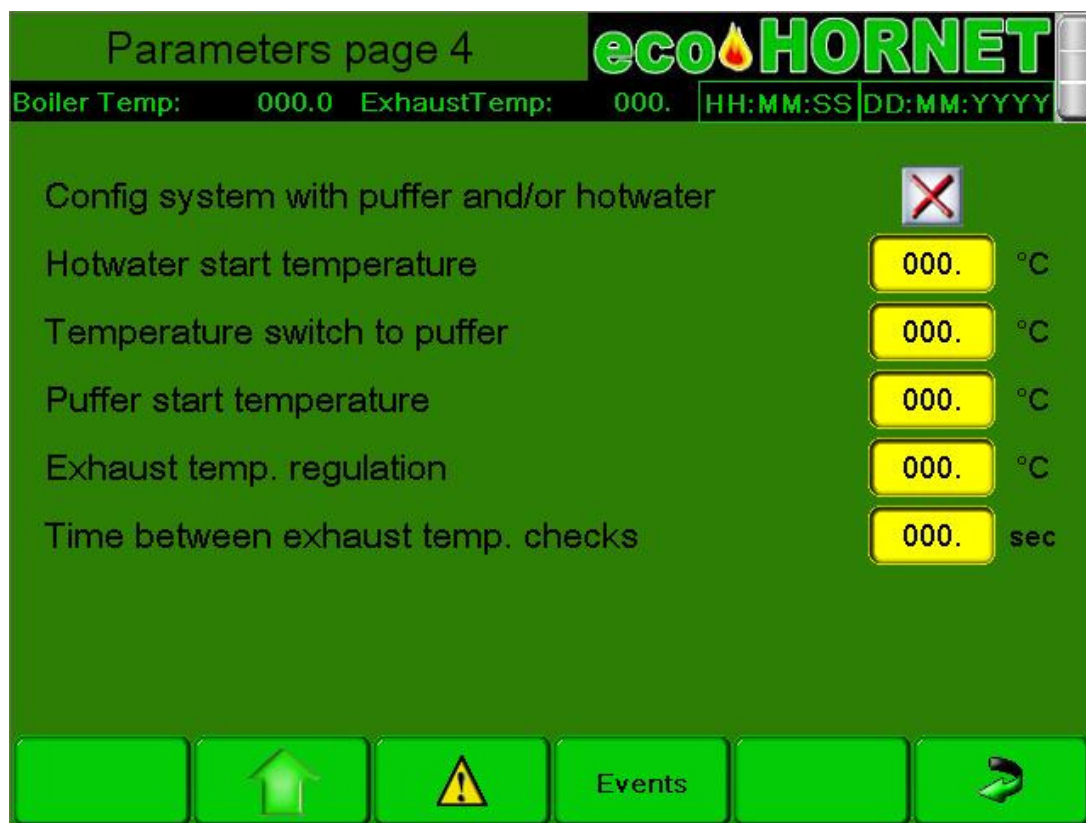


Fig. 17 Parameter page 4

3.1.2 Flow sensor adjustments

Flow sensor adjustments:

- Turn the unit off and wait for the recirculation pump to stop;
- Remove the bolt on top;
- Using a fine screwdriver that can be easily inserted in the hole, turn clockwise until the amber light turns on;
- Then, turn anti-clockwise until the red light turns on, then an additional 360° (a complete turn) in the same direction;
- Tighten the top bolt.

3.2 Checks

3.2.1 Checking the capacitive sensor

If the capacitive sensor has been removed from its support during installation, it will be mounted in the same position:


- 2-3 mm from the glass & epoxy element surface (flush with the flange that fastens the glass & epoxy element);

- aligned to the center of the flange opening;

Also adjust the sensor using a thin, flat screwdriver that can be inserted in the opening on its back, as follows:

- turn the bolt clockwise until the light turns on;
- turn it anti-clockwise until the light turns off and an additional 180° (half turn) afterwards.

3.2.2 *Equipment operation checks. Manual testing screen.*

Use the gray key in the top left corner of the screen to select the Manual operating mode (by touching the key twice). When this mode is selected, the  key will be displayed in the bottom right corner of the screen: touch it to display the testing page for the systems of the heating unit (Fig. 4).

Check the unit components one by one for proper operation by actuating the key



- ignition – it is recommendable to test this system first in order to avoid pellet ignition when testing the pellet feeding;
- material screw – it is recommendable to briefly turn it on, until only a few pellets are dropped;
- anti-condensation valve - after turning it on, wait for approx. 2 seconds to see if it opens;
- boiler valve - if this valve is installed, test it in the same way as the anti-condensation valve;
- exhaust fan - check this system by pressing the value "0.0" in the yellow box on the right of "Exhaust fan" and selecting the speed expressed as percentage;
- boiler pump - check the operation of the pump.

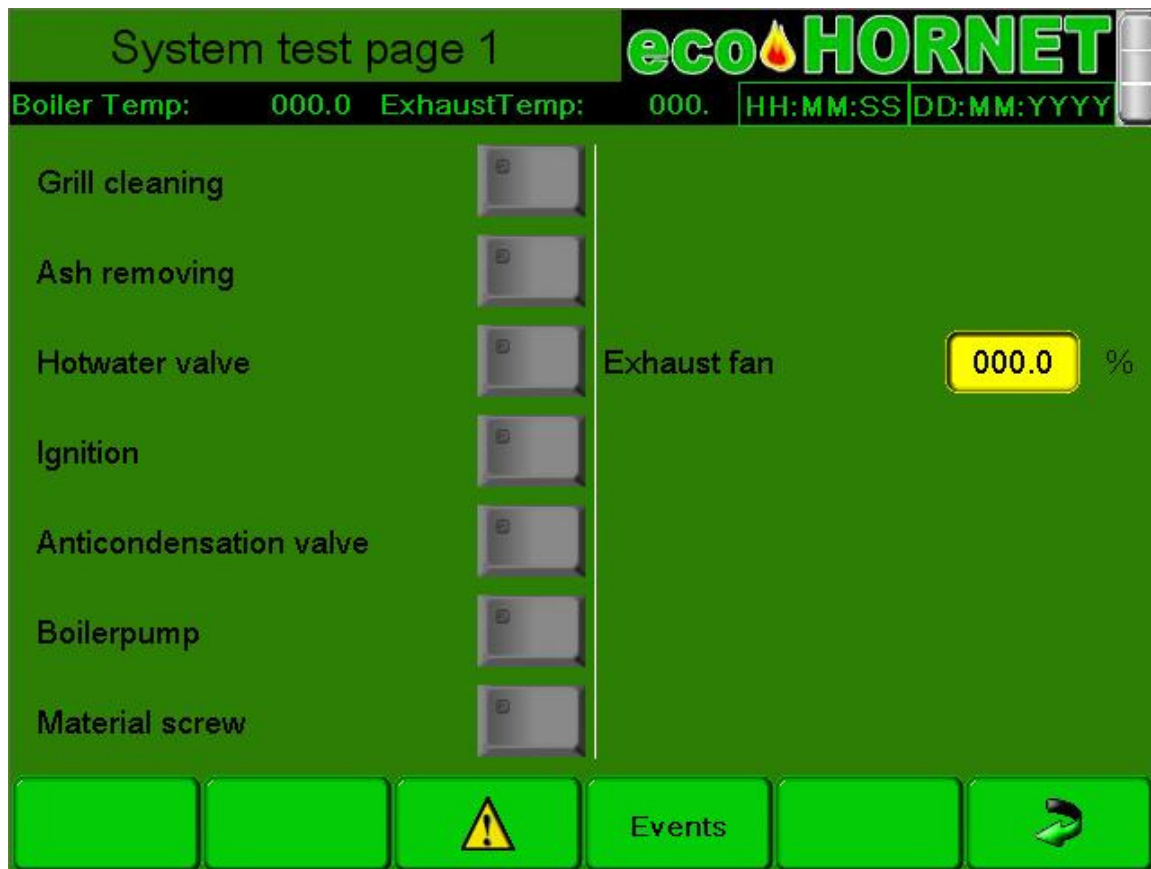


Fig. 4 Manual testing of the system

3.2.3 Checking the feeding neck and flue kit for leaks

Check the connection between the outlet of the feeding screw in the hoper and the feeding inlet of the unit. The connection must be **airtight** to prevent air inleakage.

Check the ash bin door for leaks.

Check the adjustment of the capacitive sensor and the tightness of the glass & epoxy element.

Check for leaks the connection between the flange of the exhaust fan and the exhaust flue and the connection of the flue kit, as well as the proper routing of the flues up to a level above the roof ridge.

Check the combustion air intake, if the wall flue supplied by the manufacturer has not been installed.

3.3 Commissioning

! WARNING: Do not start the heating unit before performing all the checks described above.

The heating unit must be commissioned by qualified personnel certified by the exclusive dealer.

The electrical control equipment should not be operated by persons with impaired physical, sensory or mental abilities.

In the STOP position, check and adjust the flow sensor.

Perform the natural draft test as follows:

- turn the unit on (after performing all checks and after reading the User's Manual)
- wait for aprox. 20-25 minutes for the unit to start heating
- turn off the UPS

If you notice slow burning on the grill when the power is off (approx. 10 minutes) and there is no smoke in the burning chamber, the proper natural draft for exhaust gas evacuation is achieved and you may restart the UPS. Wait again for the start screen to load and if the unit receives a start signal again and the starting conditions are met, the ignition will be initiated. Otherwise, it will remain on standby until all the starting conditions are achieved.

If there is smoke inside the unit, it is **FORBIDDEN** to start the unit until the installation deficiencies of the flue system are eliminated.

Adjust the ignition time, depending on the, humidity and composition of pellets, from 60 to 90 seconds.

Adjust the grill cleaning time depending on pellet humidity and composition:

EXAMPLE: (when changing the pellet type, contact the dealer or the manufacturer)

- **straw pellets and agro-pellets = 30-90 seconds,**
- **pine pellets = 180-210 seconds, humidity up to 8%**
- **pine pellets = 240-280 seconds, humidity up to 10%**
- **oak pellets = 210-250 seconds**
- **ash pellets = 280-320 seconds**

After 2-3 hours of operation after the start, remove and clean the Y filter (it may be clogged by particles or hemp residues from the system connections).

After this operation, it is recommendable to bleed the system again and to operate the water circulation and recirculation pumps of the system at low speed for optimal heat transfer.

4 Operating instructions

4.1 Operation description

The unit starts when it receives an external start signal from the ambient thermostat (if the thermostat is not connected directly to the recirculation pump, but to the system) or when the temperature inside the puffer and/or boiler decreases below the set limit.

Initially, the exhaust fan starts at full speed (100%) over the entire pellet feeding time, when the LED of the level sensor indicates the filling of the feeding area with pellets.

In the second phase, the ignition starts and the speed of the exhaust fan is automatically reduced. At the end of the ignition time, the exhaust fan returns to the operating speed set for heating.

Boiler states:

- Stop - The heating unit is on standby, waiting for an external start signal, has been manually stopped or turned off due to reaching a stopping condition;
- Start - The boiler is waiting for the pellet feeding, ignition and ignition check to complete;
- Heating - This state arises after ignition has been checked and burning starts;
- Error - The boiler enters this state in case of failure.

Burner states:


- Standby - The unit is on standby, waiting for an external start signal;
- Flow sensor check - The operation of the recirculation pump and the continuous flow of water is checked by the flow sensor;
- Pellet feeding - Pellets are fed into the burning chamber;
- Ignition - The ignition of pellets is initiated;
- Flame check - The successful ignition is checked (if ignition failed, the unit makes two more attempts to ignite, then enters the error mode)
- Heating - The burner is in operation;
- Flame stop - The pellet feeding stops and the unit burns the remaining material;
- Flame quick stop - In case of failure, the burner performs the flame quick stop by continuously operating the grill cleaner and the exhaust fan.

State of the cleaning, fluidization and pellet discharge system

- Cleaning - The unit is on standby or stopped;
- Standby - The cleaning system is waiting for the displayed time to perform a new cleaning;
- In operation - The cleaning system is cleaning the grill;

- Quick operation standby - The cleaning system operates continuously to quickly discharge the pellets (this operating mode is initiated in case of failure, to quickly extinguish the fire)

4.2 Display screens

The following paragraphs describe the information screens showing the current operating parameters of the unit, which are displayed by pressing the  key:

The first screen shows a flow chart of a heating unit equipped with a puffer (Fig. 11), where the user can view the current water temperature on the supply and return lines of the boiler and the water temperature inside the puffer, if applicable.

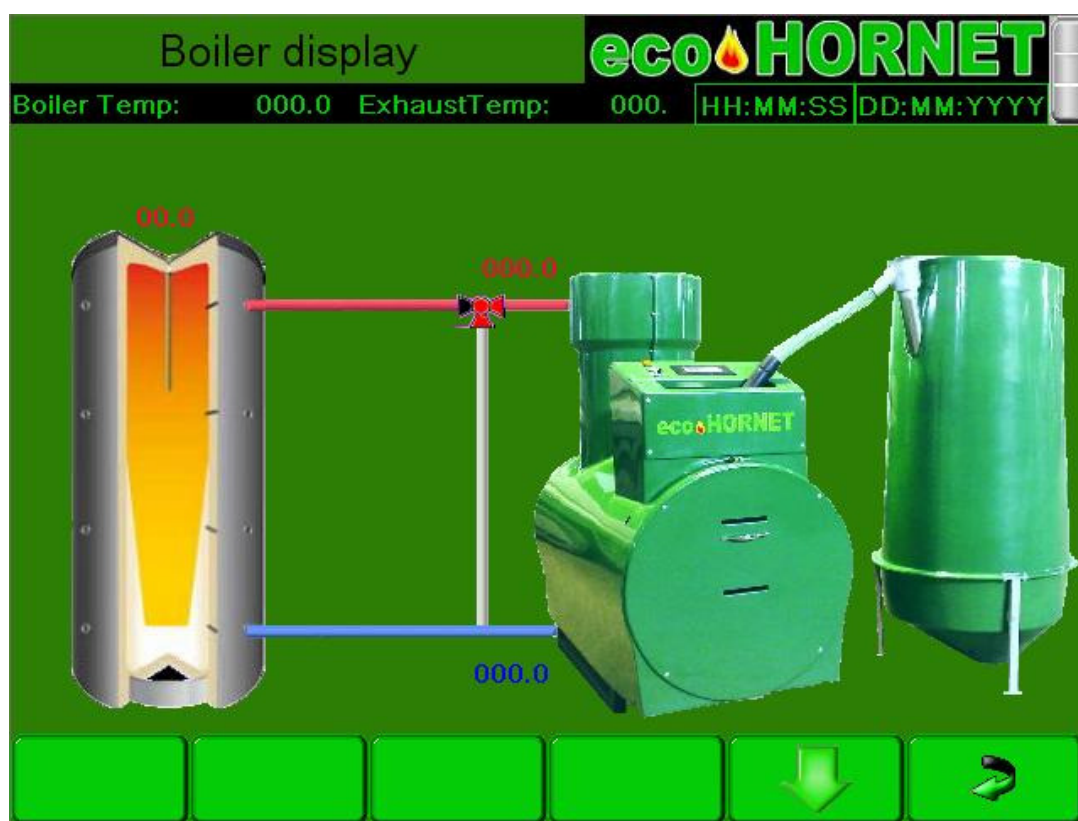



Fig. 11. Boiler screen

Touching the  key will display the parameters during operation (Fig. 12). This permits the real-time viewing of supply line temperature, exhaust temperature and the temperature readings of the puffer and/or boiler probes, if applicable.

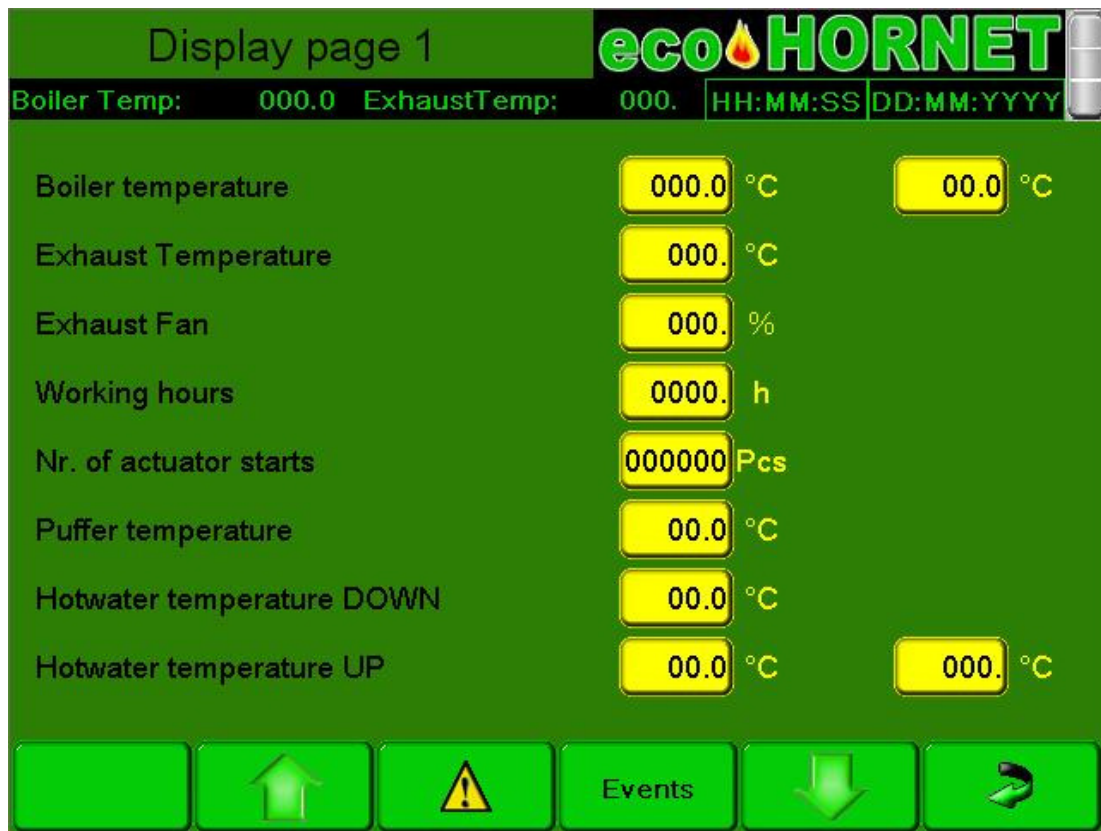



Fig. 12 Screen displaying the operating parameters

You can also view the unit operation time and the number of starts of the linear motor of the cleaning, fluidization and pellet discharge system, as well as the current speed of the exhaust fan.

Pressing the  key opens the third page of the screen, which shows the digital inputs and outputs of the unit (Fig. 13), i.e.:

- Digital inputs
 - Presence of 230V power supply – line power supply (on when the unit is supplied from the power line instead of other auxiliary supply sources, e.g. the UPS);
 - Pellet sensor - the state of the pellet sensor (on, if the sensor detects pellets in the feeding area);
 - Flow sensor - on when the flow sensor detects a proper water flow in the system;
 - Room thermostat - on when the ambient thermostat is connected to the system and receives the start signal.
- Digital outputs
 - Grill cleaning - On when the cleaning, fluidization and pellet discharge system is on;
 - Ash removing - On when the ash removal motor is on;
 - Ignition - On when ignition is on;

- Boiler valve - Off when the boiler valve is in the boiler feeding position and on when the boiler valve is in the puffer feeding or house heating position;
- Anti-condensation valve - Off when the anti-condensation valve is in the water recirculation position, to prevent condensation, and on when the anti-condensation valve is in the position for recirculating the water inside the system;
- Recirculation pump - On when the recirculation pump receives a water recirculation signal;
- Exhaust fan - On when the exhaust fan is on, irrespective of its operating speed;
- Pellet feeding - On when the pellet feeding motor receives the start signal.



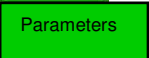
Fig. 13 Digital inputs and outputs


To return to the main screen, press , and to return to a previous page press .

4.3 Parameter adjustment screen

! WARNING: The parameters that may be modified by the user will be described in the following paragraphs. These parameters may be modified only by direct consultation with the personnel authorized by the dealers and only in case of changing the pellets type.

! WARNING: The modification of any other parameters than indicated below without consulting with the qualified personnel may result in voiding the warranty.

The screen for adjusting the operating parameters of the **ecoHORNET** heating unit will be displayed by touching the button 

Touching the button  the second page will be displayed (fig. 15), with the following parameters:

- *Grill cleaning starts after* – The waiting time for the first start of the cleaning, fluidization and pellet discharge system after ignition is completed;
- *Duration between grill cleanings* – The time between two successive operations of the cleaning, fluidization and pellet discharge system;

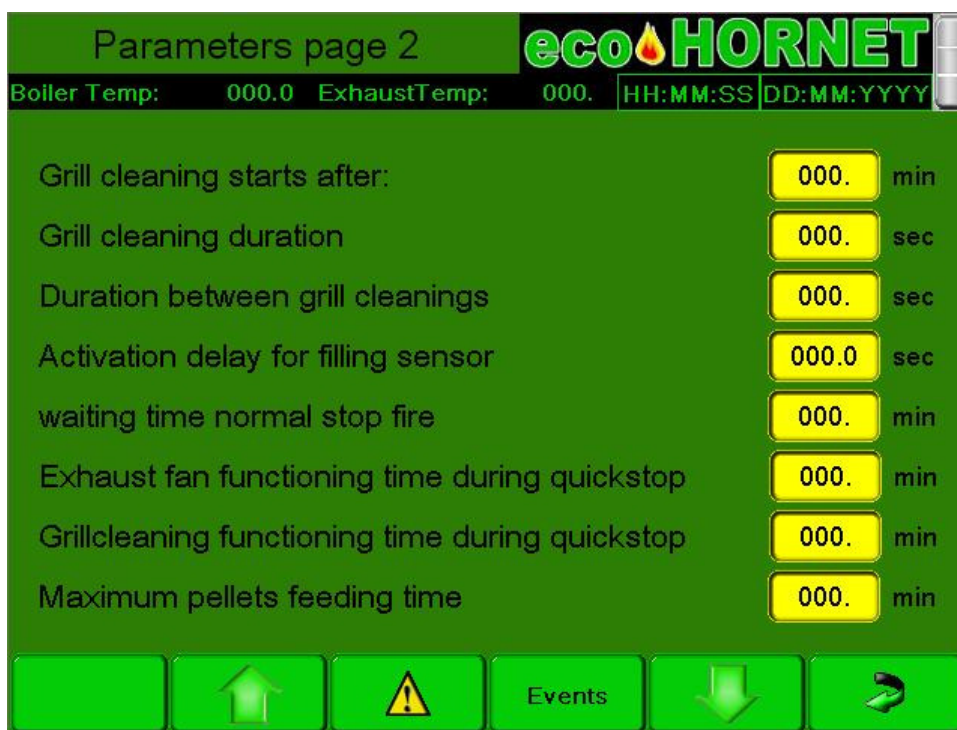


Fig. 15 Parameter page 2

4.4 Settings screen


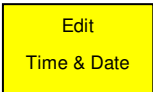

Pressing  will display the unit's settings page (Fig. 6):

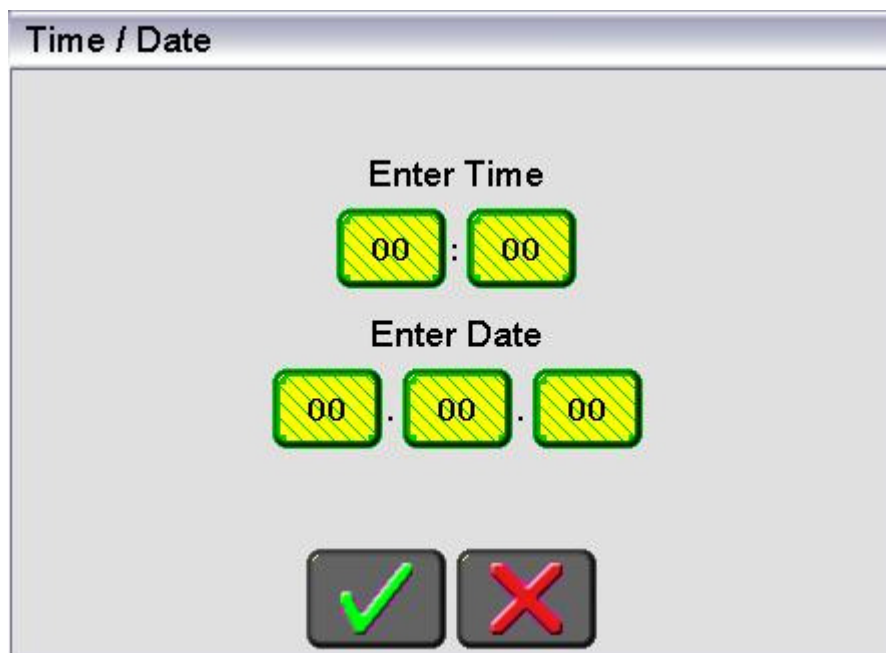


Fig. 6 Settings page

Pressing  will open a window (Fig. 7) where you can change the time and date displayed in the top right corner of the screen. When pressing each value, a numeric keypad will open to input the desired value, which will be validated by pressing Enter.

After setting the desired values, validate the time and date by pressing .

To return to the main screen, press .



Time / Date

Enter Time

00 : 00


Enter Date

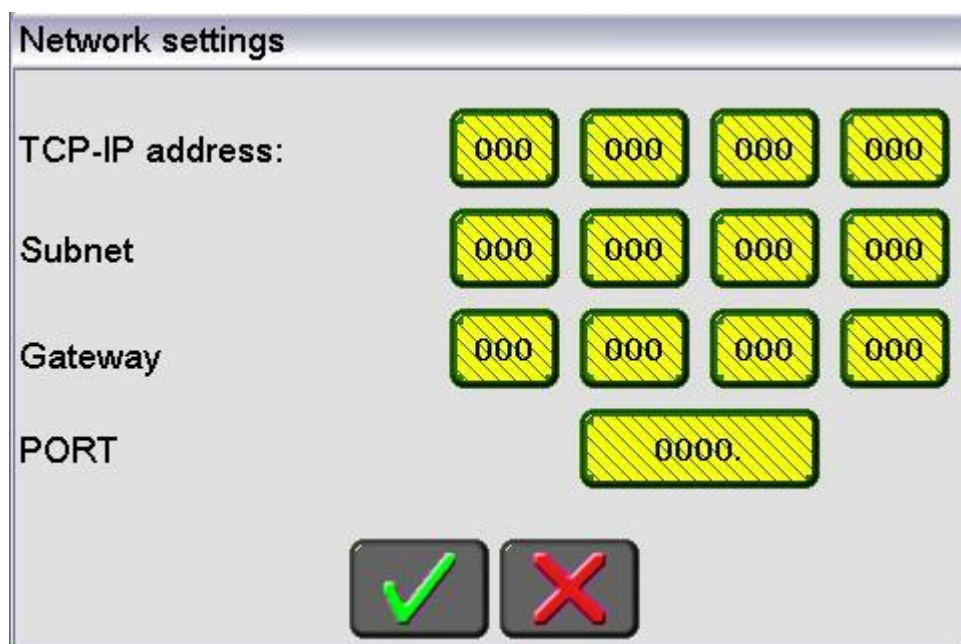
00 . 00 . 00

✓ ✗

Fig. 7 Time/Date



Pressing  will open a window (Fig. 8) where you can modify the IP, the subnet mask and the gateway, if the heating unit is connected to a network to allow you view the operating data on a computer.



Network settings

TCP-IP address: 000 000 000 000



Subnet 000 000 000 000

Gateway 000 000 000 000


PORT 0000.

✓ ✗

Fig. 8 Network settings

Validate the network addresses by pressing . If you want to discard the changes, press .

4.5 List of events


Pressing  will open a window (Fig. 10) in which all the changes to the operating parameters of the heating unit are displayed.

ecoHORN^{ET}

boiler temp: 66.0 ExhaustTemp: 96 14:10:51 14.06.2012

Time of change	Change	Old value	New value	
14.06.12 - 10:23:27	CasCadeControll1.P_WaitStartNextBoiler	10 min	50 min	▲
13.06.12 - 21:28:56	System switched on			▲
13.06.12 - 21:27:21	System switched off			
13.06.12 - 20:48:20	SwitchHotWaterValve1.P_HotWaterTempSet	48 °C	45 °C	
13.06.12 - 20:44:31	SwitchHotWaterValve1.P_HotWaterTempSet	45 °C	48 °C	
13.06.12 - 12:36:29	System switched on			▼
				▼
◀				▶
		!		↻

Fig. 10 List of events

To return to the main screen, press .

4.6 Monitoring the alarms

The heating unit is designed to display various alarm and failure messages in case of quick stop. A notification with white text on red background will be displayed in the top left corner of the screen.

ALARMS:

1. *Hardware failure*

Two failures are possible if this error message is displayed. First, it may be a physical interruption in the communication between the display and the automation board and second, the automation board may be defective.

2. *Flow sensor failure*

This error message is displayed when the flow sensor does not detect a proper water flow rate upon turning the unit on or during its operation.

3. *No pellets in hopper*

This error message is displayed when the pellet feeding motor is in continuous operation, but the sensor next to the feeding area fails to detect the filling within the time set for the "Maximum pellet feeding time" parameter in the second page of the parameter screen. This failure may be caused by:

- Absence of pellets in the feeding hopper;
- Pellet feeding assembly blocked by various foreign objects;
- Accumulation of dust resulting from crushed pellets at the bottom of the hopper;
- Failure of the pellet feeding sensor;
- Failure of the pellet feeding motor;

4. *Ignition failure*

This error message is displayed if the igniting element fails to ignite the pellets on the grill after 3 attempts. This error may be caused by:

- Pellets too damp;
- Failure of the ignition element(s);
- Exhaust fan speed too fast on ignition;

5. *Exhaust sensor failure*

This error may occur if the exhaust sensor is defective or the exhaust gas temperature measured by the sensor is below 30°C. It may also be caused by the loss of connection between the temperature sensor and the automation board (due to an external physical interruption).

6. Supply line sensor failure

This error message may be displayed in case of failure of the temperature sensor on the supply line of the boiler, of connection loss between this sensor and the automation board (due to an external physical interruption) or if a temperature of 0°C or 100°C is reached. The 0°C alarm is intended to prevent the starting of the unit if the system piping is blocked by frozen water, while the 100°C alarm is meant to quickly stop the fire and prevent an incident caused by the failure of an element of the heating system (recirculation pump, safety kit, valves).

7. Exhaust temperature too high


This warning is displayed if the value set for the "Exhaust temperature (alarm)" parameter is reached, indicating an unusual increase in the exhaust gas temperature.

8. No 230 V power supply

This alarm message is displayed in case of failure of the line power supply. The unit will switch to UPS operation and will initiate the quick stop procedure. **WARNING!** The UPS will operate for up to 30 minutes and requires at least 6 hours to recharge to full capacity.

9. The boiler needs to be cleaned. The heating unit will not start. Please, contact the manufacturer.

This error message is displayed when the temperature set for the "Exhaust temperature stops boiler" parameter is reached and the heating unit will stop, blocking all controls. In this case, you must contact the manufacturer.

Pressing  will display the list of alarms (Fig. 9) occurring during the operation of the unit, the dates of activation and deactivation of the alarms, as well as the names of the alarms.

AlarmList

ecoHORN^{ET}

boiler temp: 66.5 ExhaustTemp: 96 14:11:52 14.06.2012

Nr	activated	deactivated	Alarm description	
0009	10:56 14.06	10:58 14.06	Flow sensor defect	▲
0002	10:56 14.06	10:58 14.06	No power supply	
0002	21:26 13.06	21:26 13.06	No power supply	
0009	23:14 12.06	23:15 12.06	Flow sensor defect	
0002	23:13 12.06	23:15 12.06	No power supply	
0009	11:08 08.06	11:09 08.06	Flow sensor defect	
0002	05:16 04.06	05:16 04.06	No power supply	▼
◀				▶
			Events	

Fig. 9 List of alarms

To return to the main screen, press .

5 Unit maintenance instructions

The **ecoHORN^{ET}** do not require frequent checks - an annual overhaul is sufficient and it is performed free of charge in the first year by the authorized warranty service personnel. After the end of the warranty period, the user can conclude a service contract or, if he does not want to conclude such contract, the user will receive a set of instructions to be observed on the annual overhauls.

The **ecoHORN^{ET}** heating units must be overhauled and cleaned of deposited microparticles by the owner or by the service personnel authorized by the manufacturer, once a year or when a "unit cleaning" message is displayed (this message is displayed when the exhaust temperature exceeds 170 degrees, notifying the fact that the heat exchange has diminished, the unit efficiency is decreasing and the fuel consumption started to increase). The use of pellets or cereals with humidity in excess of 10% and the frequent power failures may reduce this cleaning interval. The soot and particle deposits caused by improper operation (pellets with humidity

exceeding 10%, frequent operation on natural draft due to power failures or the stopping of the grill cleaning system) result in excess deposits on the exhaust flues and reduce the speed of the exhaust fan, reducing the draft and the intake of combustion air. The exhaust temperature no longer exceeds 80°C, the water in the boiler is insufficiently heated and condensation occurs. In this case, only a general cleaning will restore the initial parameters of the unit.

Example:

After commissioning, temperatures of 70°C on the supply line and exhaust temperatures of 110°C are obtained. After operation, in time, an increase in the exhaust gas temperature is noted (for 70°C on the supply line, exhaust temperatures of 120, 130, 140, 150°C) due to microparticle deposits from pellets with humidity in excess of 10%, damp cereals or frequent power failures. Even if the temperature reached does not trigger the "clean the unit" message, an overhaul is recommendable to avoid a decrease in the efficiency of the unit. Moreover, abundant deposits may suddenly decrease the exhaust temperature below 80 degrees by blocking the exhaust piping, resulting in condensation.

After cleaning, the normal unit parameters will be restored.

5.1 Hopper feeding

The hopper may be fed at any time. When opening the pellet bags and emptying them into the hopper, it is recommendable to monitor the flow of pellets to avoid dropping foreign objects that may block the feeding screw (e.g. nylon or raffia pieces, nails, pieces of unprocessed raw material, etc.)

! WARNING: If pellets containing chemical binders are used, their burning may generate deposits on the burning grill, inevitably resulting in a loss of boiler power. In such case, the burning grill must be removed and cleaned. Check the feeding chamber and use proper pellets. After cleaning, the normal boiler parameters will be restored.

5.2 Ash removal

The boiler cleaning includes the ash removal, which must be performed at proper intervals (max. 5 days), depending on the quality of the pellets used (e.g. if agro-pellets - straw pellets are used, ash must be removed every day) to assure the necessary ash storage space.

! WARNING: If ash reaches the grill, it will block the grill cooling air flow. The temperature can exceed 1400 degrees, bending the axle of the cleaning and acceleration pushers. If improper pellets exceeding 10 % humidity are used, the

burning will be incomplete and soot deposits will form on the heat exchanger, reducing efficiency and requiring monthly cleaning.

! WARNING: The ash will be removed using the supplied scoop and will be stored in a metal container.

! WARNING: Tightly close the ash bin door after removing the ash. The heating unit cannot operate at the set parameters with the ash bin door open or improperly closed.

5.3 Cleaning the glass & epoxy element

Due to the deposits of microparticles generated by pellets with humidity above 10%, damp cereals or frequent power failures, a carbon layer may form on the glass & epoxy window, which may prevent the capacitive sensor from properly reading the pellet level. In this case, clean the window as follows:

Remove the front part of the case (the one that covers most of the feeding neck), remove the intermediate pellet feeding hose from the feeding neck of the unit, remove from the connecting flange of the feeding neck elements (25 the upper part (by loosening the four \varnothing 6 vertical bolts), carefully clean the window (24) (on the inside, without leaving dampness traces and without changing the position of the capacitive sensor), install the upper part of the feeding neck, restoring the heat insulation and sealing and install the intermediate hose, restoring the sealing between the hose and the feeding neck with great care. After these operations are successfully completed, you may restart the heating unit.

After cleaning the window, if the capacitive sensor has been removed from its support, it will be mounted in the same position:

- 2-3 mm from the glass & epoxy element surface (flush with the flange that fastens the glass & epoxy element);
- aligned to the center of the flange opening;

Also adjust the sensor using a thin, flat screwdriver that can be inserted in the opening on its back, as follows:

- turn the bolt clockwise until the light turns on;
- turn it anti-clockwise until the light turns off and an additional 180° (half turn) afterwards.
- Tighten the top bolt.

! WARNING: Before restarting the heating unit, check the feeding neck for leaks.

5.4 Cleaning the grill

If pellets containing chemical binders are used, their burning may generate deposits on the burning grill, inevitably resulting in a loss of boiler power. In such case, the burning grill must be removed and cleaned. Check the feeding chamber and use proper pellets.

Remove the burner grill by loosening the 4 \varnothing 8 bolts (only 3 for CT 20) perpendicular to the front of the boiler, remove the ignition element connectors, remove the \varnothing 8 bolt on the right that connects the pulling axle of the burner grill to the fluidization and acceleration mechanism, remove the grill from its initial position, clean the grill of deposited impurities (using a degreasing solution and an object that can be introduced between the grill bars), wait for the grill to dry, install the grill in the initial position and restart the unit.

After cleaning, the normal boiler parameters will be restored.

5.5 Maintenance of the heating system

Depending on the nature and quality of the heating medium in the system, check the bleeding valves regularly.

It is recommendable to also check the flow sensor at regular intervals and, if not all the green lights are on during its operation and only the red light is on during standby, it is recommendable to readjust it as follows:

- Turn the unit off and wait for the recirculation pump to stop;
- Remove the bolt on top;
- Using a fine screwdriver that can be easily inserted in the hole, turn clockwise until the amber light turns on;
- Then, turn anti-clockwise until the red light turns on, then an additional 360° (a complete turn) in the same direction;

! WARNING: The bolt of the breather in the safety kit must be open during operation.

! WARNING: All maintenance operations must be performed with the heating unit turned off and cooled.

! WARNING: All maintenance operations must be performed with the heating unit turned off, cooled, disconnected from the main power supply and with the UPS turned off.

6 Troubleshooting

Certain malfunctions that can be remedied by eliminating their causes may occur during the operation of the heating unit.

No.	Problem	Cause	Solution
1	Hardware failure	Physical interruption of connection between the display and the automation board	Authorized service
		Automation board or display failure	
2	Flow sensor failure	Airlock in the system	Bleed the heating system and the recirculation pumps.
		Flow sensor failure	Have the flow sensor replaced and adjusted by authorized personnel.
		Recirculation pump failure	Replace the recirculation pump, bleed the pump and the system and check the pressure
		Physical interruption of connection	Check the connection between the unit and the flow sensor and fix it
3	No pellets in hopper	There are no pellets in the hopper	Fill the hopper with pellets
		The screw is blocked or broken by foreign objects accidentally introduced in the hopper (nails, bolts, wood pieces, etc.)	Disconnect the cable from the front cover, remove the pellet feeding hose, remove the screw from the hopper and clean it carefully and switch on the fuse at the bottom of the screw motor's case. Insert the screw in the hopper in its initial position, carefully seal the pellet feeding hose and turn on the unit.
		Deposits of dust resulting from the crushing of pellets	Empty the hopper and remove the dust deposited on the bottom. After emptying the hopper, reinstall the hopper and the screw in their initial positions, seal the screw hose connections and fill the hopper.
		Capacitive sensor failure	Have the sensor replaced and adjusted by authorized personnel
		Failure of the pellet feeding motor	Replace the motor
4	Ignition failure	Pellets too damp	Use proper pellets
		Failure of the ignition element(s)	Replace the ignition element
		Exhaust fan speed too fast on ignition	Set the value of the "Exhaust fan speed during ignition" parameter slightly lower (min. 30%).

5	Exhaust sensor failure	Physical interruption of connection between the sensor and the automation board	Authorized service
		Sensor failure	
		Sensor exposure to temperatures below -30°C	Remove the sensor from its support and heat it
6	Supply line sensor failure	The temperature of 100°C is reached	Check the operation of the recirculation pump, anti-condensation valve and heating system (valve closed). Replace them, if defective.
		The temperature of 0°C is reached	(Freezing hazard) Have the entire heating system checked by a qualified person, recirculation pump check, anti-condensation valve check, flow sensor check. If everything is OK, reset the alarm and start the unit.
		Sensor failure or physical interruption of connection between the sensor and the automation board	Authorized service
7	Exhaust temperature too high	Microparticle deposits caused by pellets with humidity in excess of 10%, cereals or frequent power failures	Clean the convection heat exchanger, the exhaust fan and the exhaust piping. After cleaning, the initial parameters of the unit are restored.
8	No 230 V power supply	Power supply failure	Check for a failure of the main power supply or verify the connection between the unit and the power supply line
9	The boiler needs to be cleaned. The heating unit will not start. Please, contact the manufacturer	Microparticle deposits caused by pellets with humidity in excess of 10%, cereals or frequent power failures. The "Exhaust temperature too high" alarm was ignored	Clean the convection and radiation heat exchangers, the burner grill, the exhaust fan and the exhaust piping. Contact the manufacturer to receive a restarting password. After cleaning, the initial parameters of the unit are restored.

! WARNING: All maintenance operations must be performed with the heating unit turned off, cooled, disconnected from the main power supply and with the UPS turned off.

Thank you for choosing ecoHORNET products!

Warm regards,

Aurel & Iuliean Hornet

eco  HORNET

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